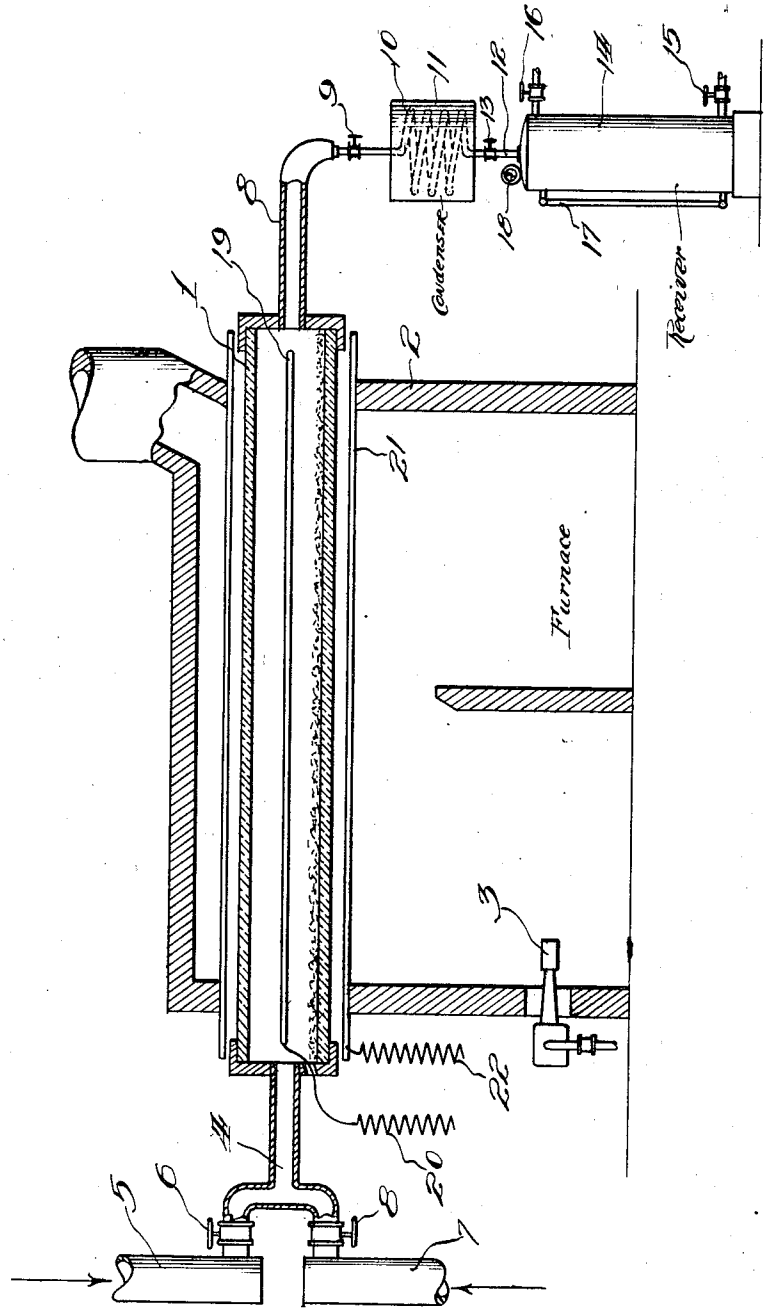
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PROCESS AND APPARATUS FOR FORMING OXIDATION PRODUCTS OF HYDROCARBON OILS

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PROCESS AND APPARATUS FOR FORMING OXIDATION PRODUCTS OF HYDROCARBON OILS.

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This invention relates to a process and apparatus for producing oxidation products of hydrocarbon oils, and refers more particularly to a process in which the oxidation takes place while the oils are in vaporous phase.

Among the salient objects of the invention are to provide a process in which oil vapors are passed through a zone in which an electrical current of high potential is maintained, the vapors being combined prior to their passage there-through with regulated quantities of oxidizing gases whereby certain desired oxidation products are obtained; to provide a process in which the oxidation mediums introduced with the hydrocarbon oil may consist of either oxygen or chlorine containing substances, whereby either oxidized or chlorinated products are produced; to provide a process in which the reaction may take place in the presence of a catalyzing substance in order to both promote and improve the character of the final products, and to provide an apparatus for carrying out this process.

The single figure is a diagrammatic side elevational view of the apparatus with parts and section.

Referring to the drawings, an insulating tube such as a quartz tube shown at 1 is mounted in a furnace 2 which is preferably heated by means of gas burner 3. At one end of the tube is connected a Y pipe 4 through one leg 5 of which may be introduced oxidizing gases and their flow controlled by means of the valve 6. Through the other leg 7 controlled by the valve 8 are introduced the hydrocarbon gases from any suitable vaporizing means, the apparatus may be connected to the vapor line of a still or cracking apparatus and the vapors maintained either under pressure or atmospheric condition, the conditions maintained depend primarily upon the character of the oil treated and the products desired.

To the opposite end of the tube is connected a draw-off line 8 controlled by a valve 9 which communicates with a condenser coil 10 mounted in the condenser box 11. The discharge end of the coil is connected by means of a pipe 12 regulated by a valve 13 to the receiving tank 14 which is equipped with a liquid draw-off valve 15, a pressure relief valve 16, liquid level gauge 17 and a pressure gauge 18. Centrally in the tube 1 is positioned an electrode 19 which has wire connections as shown at 20 to any convenient source of power, not shown. A metal tube electrode 21 surrounds the tube 1 and has likewise electrical connections 22 to a power source, not shown.

The electrical currents supplied to the central electrode 19 and the outer tube 21 are of such character that there is during operation a silent electrical or corona discharge between the two elements.

In operation the gaseous vapors are passed from the still through the line 7 and are introduced through the line 4 to the tube 1. Simultaneously there is introduced through the pipe 5 an oxidizing gas in controlled quantities such as substance, ozone, nitric oxide, nitrogen tetroxide, chlorine, or numerous other oxidizing materials, the gaseous hydrocarbons and oxidizing gases combining and traveling through the tube 1, where they are subjected to the effect of the electrical discharge.

Under certain conditions it may be an advantage to have in addition to the electrical effect upon gaseous substances, a catalyzing material such as aluminum chloride, ferric oxide or like substances positioned in the bottom of the tube to promote and improve the reaction which takes place.

By oxidizing hydrocarbon oils in this manner, there may be produced derivatives of hydrocarbon material such as alcohol, aldehydes, ketones and organic acids. Such derivatives of hydrocarbon materials are formed from petroleum products admixed with air, ozone, or oxygen and passed through a tube in which a corona discharge of the type explained is maintained.

The current or discharge is produced by means of high potential current, the electrodes being connected to the secondary of a step-up transformer or other source of high potential. A further variable is the temperature under which the reaction takes place.

Under certain conditions it may be desirable to have the tube at high temperature, while under other conditions a lower tem-

perature is more advantageous to effect a proper reaction.

The character of the oil treated and the oxidizing gas used are important factors in determining the temperature necessary for proper reaction. Oil such as gas oil, a product of mid-continent crude or kerosene and wax distillate are oils best adapted to this type of treatment.

We claim as our invention:

1. A process for producing oxidation products of hydrocarbon material consisting in vaporizing the hydrocarbon materials, in introducing to the resulting vapors an oxidizing gaseous medium in passing the resulting mixture through a zone of reaction wherein the combined products are subjected to a high potential electrical discharge in the presence of a catalyzing agent, drawing off and condensing the products formed, and maintaining a regulated pressure during reaction.

2. In an apparatus for the production of oxidation products of hydrocarbon materials the combination with an insulating means positioned in the vapor line, means for simultaneously introducing and combining vaporous hydrocarbon and oxidation mediums to said insulating means, and means for subjecting the oil while maintained therein to an electrical discharge, draw-off and condensing means connected to said insulating means, and means for maintaining a regulated pressure during reaction.

3. A process for producing oxidation products of hydrocarbon material consisting in vaporizing the hydrocarbon materials, in introducing to the resulting vapors an oxidation gaseous medium, in passing the resulting mixture through a zone of reaction wherein the combined products are subjected to a high potential electrical discharge in the presence of a catalyzing agent, and drawing off and condensing the products formed.

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